P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 2; February 2025; Page No. 308-311

Received: 19-11-2024
Accepted: 23-12-2024

Indexed Journal
Peer Reviewed Journal

Resource use and economic potential of cluster bean in Haryana

[1]Neeraj Pawar, [2]Sumit and [3]DP Malik

[1]Sr. Scientist, Department of Agricultural Economics, CCSHAU, Hisar, Haryana, India

[2]Assistant Scientist, Department of Agricultural Economics, CCSHAU, Hisar, Haryana, India

[3]Professor & Head, Department of Agricultural Economics, CCSHAU, Hisar, Haryana, India

DOI: https://www.doi.org/10.33545/26180723.2025.v8.i2e.1651

Corresponding Author: Neeraj Pawar

Abstract

The present study was conducted during 2023-24 in four districts namely, Fatehabad, Sirsa, Bhiwani and Rewari from South - West Haryana with the objective to analyse the economic potential, resource use efficiency and constants faced by cluster bean farmers. Budgeting technique was employed to draw practical implications, production function technique was used for measure the extent of resource use in cluster bean cultivation for taking policy decisions to encourage its cultivation in Haryana. The result of the study revealed that overall average per hectare total cost of cultivation was Rs. 54599. The overall average gross return of cluster bean was Rs. 69204 per hectare. The return over variable cost and net return were Rs. 43213 and Rs. 14605 per hectare, respectively. Moreover, the value of overall B:C ratio over variable and total cost was 2.66 & 1.27 which indicated the economic viability of cluster bean cultivation in the study area. The value of the coefficient of multiple determinations, R square (R^2 estimated 0.4868) indicated that 48.68 per cent of variation in the total gross income of cluster bean cultivation was explained by explanatory variables included in the model. The efficiency ratio of the inputs: machine labour, chemical fertilizers, plant protection and irrigation were greater than one indicating that the uses of these inputs were underuse. While, human labour and seed cost both were less than one which indicated over utilization of these resources. Major constraints were non fixation of MSP and insurance scheme for this crop (91.66%), less availability of good quality seed (88.33%), less adoption of package practices like under dose of fertilizer (85%), low adoption of plant protection chemicals like seed treatment (80%), price fluctuations in post-harvest period (76.66%), manual harvesting causing skin rashes responsible for labour scarcity (68.66%).

Keywords: Resource use efficiency, cluster bean, production function, B-C ratio, constraints

Introduction

Cluster bean (*Cyamopsis tetragonoloba* L.) is popularly known as Guar in India. It is an important deep rooted legume crop cultivated mostly on marginal and sub-marginal land of arid and semi-arid regions in India (Kumar *et al*., 2020) [6]. It is a multipurpose crop grown for feed, fodder, green manure (as soil fertility enhancer) and vegetable. Besides this, the crop has gained much importance in recent past due to its multifarious industrial uses with high foreign exchange earning potential. The seeds of Cluster bean contain about 18% protein, 32% fiber and 30-33% gum in the endosperm (Sharma *et al*., 2011) [9]. This crop grows well in deep alluvial and sandy loams soils. It is highly susceptible to water logging condition or excessive wetness. India is the largest producer of cluster bean contribution around 80 per cent of the world production (Yadav and Shalendra 2013-14) [12]. India is the major exporter of guar gum and its derivatives to united states of America. Rajasthan is the largest cluster been producing state in India followed by Haryana, Gujarat, UP, MP and Punjab. In Haryana its occupied an area of 108 thousand hectare with a total production of 900 thousand tonnes with productivity 831 kgs/ha in 2023-24 (Guar Gum Global Market).

Resources use efficiency in agriculture plays an important role in determining the farm production and income, manure and fertilizer, irrigation facilities, plant protection, Seed Cost, Machine labour and Human Labour are major crucial inputs in agriculture. The efficiency in the use of scarce resources, farmers can augment their income and saving keep in view, an attempt was made to work out costs and returns as well as efficiency of various resources and constraints in cultivation of cluster bean.

Methods and Materials

The study was carried out during 2023-24 in four districts (Fatehabad, Sirsa, Bhiwani and Rewari) from southern zone of Haryana. The purposive and random sampling techniques were used to select, villages and farmers. Further Sixty farmers were selected on random basis to extract relevant information pertaining to the extent of use of various Inputs. The prevailing market prices of purchased inputs, hired labour, imputed value of family labour were taken into account to work out economic viability of Cluster bean cultivation.

The Cobb-Douglas production function was used for estimating the resources used in Cluster

Y= aX 1 b 1 *X 2 b 2 *X 3 b 3 *X 4 b 4 *X 5 b 5 *X 6 b 6

Where,
Y = Dependent Variable (Gross income Rs./ha)
a = Constant
X 1 = Human labour (Rs./ha)
X 2 = Machinery (Rs/ha)
X 3 = Seed cost (Rs./ha)
X 4 = Fertilizer cost (Rs/ha)
X 5 = Irrigation cost (Rs./ha)
X 6 = Plant protection (in Rs/ha)

From the above production function the M.V.P. of each resource was worked out. The marginal value and productivity of particular input ''xi' as geometric mean of input and output is expressed in following equation:-

$MVPXi = biY\bar{\imath}\ X\bar{\imath}\ Pxi$

Where,
MVP = Marginal Value Productivity
$\bar{Y}i$ = Gross value of out- put (Rs.)
$X\bar{\imath}$ = Factor of production
bi= Regression coefficient of xi
Pxi= Price of xi Trends and growth.

The perception of identified farmers was recorded through interaction at field for various constraints inhibiting the cultivation of Cluster bean. The responses of cultivation for production and marketing of Cluster bean were noted.

Results and Discussion

Cost and return of cluster bean cultivation in Haryana

The item wise break-up of cost of cluster bean cultivation in Fatehabad, Sirsa, Bhiwani, Rewari districts and overall average are presented in table 1. Per hectare total cost of cluster bean cultivation in Fatehabad, Sirsa, Bhiwani and Rewari districts were Rs. 56406, 57383, 52601 and Rs. 52008, respectively. Total variable cost was Rs. 26765, 26975, 25219 and Rs. 25007 in Fatehabad, Sirsa, Bhiwani and Rewari districts, respectively. Expenditure on field preparation, seed & sowing, manure & fertilizers, plant protection, irrigation, and harvesting were the important component of total variable cost. The expenditure incurred on harvesting & threshing was the highest and to be workout (17.95, 17.34, 18.11 & 18.70%) followed by field preparation (9.00, 9.45, 8.47 & 9.15%), plant protection (8.02, 8.50, 8.03 & 7.81%), seed & sowing (5.30, 5.10, 5.59 & 5.82%), irrigation (3.06, 2.38, 3.71 & 2.45%) and manure & fertilizers (2.52, 2.66, 2.42 & 2.52%) in Fatehabad, Sirsa, Bhiwani and Rewari districts, respectively. Similarly, rental value of land and management & risk factor were the major components of fixed cost, which accounted for Rs. 23500 & Rs. 5353, Rs. 24250 & Rs. 5395, Rs. 21500 & Rs. 5044 and Rs. 21225 & Rs. 5001 per hectare in Fatehabad, Sirsa, Bhiwani and Rewari districts, respectively. The gross return of cluster bean in Fatehabad, Sirsa, Bhiwani and Rewari districts was Rs. 71090, Rs. 68371, Rs. 67678 and Rs. 69678 per hectare, respectively. The return over variable cost and net return were Rs. 44325 & Rs. 14684, Rs. 41396 & Rs. 10988, Rs. 42459 & Rs. 15077 and Rs. 44671 & Rs. 17670 per hectare in Fatehabad, Sirsa, Bhiwani and Rewari districts, respectively. The B: C ratio over variable cost and total cost in Fatehabad, Sirsa, Bhiwani and Rewari districts was 2.66 & 1.26, 2.53 & 1.19, 2.68 & 1.29 and 2.79 & 1.34 respectively. Similar, findings were also observed by Bajwan *et al*., (2023) [2] and Bhupender and Kumar (2020) [4].

Similarly, overall average per hectare total cost of cultivation and variable cost of cluster bean were Rs. 54599 and Rs. 25991, respectively. The expenditure incurred on harvesting & threshing was the highest and to be workout (18.01%) followed by field preparation (9.03%), plant protection (8.10%), seed & sowing (5.44%), irrigation (2.89%) and manure & fertilizers (2.53%). Similarly, rental value of land and management & risk factor were the major components of fixed cost, which accounted for Rs. 22619 & Rs. 5198 per hectare, respectively. The overall average gross return of cluster bean was Rs. 69204 per hectare. The return over variable cost and net return were Rs. 43213 and Rs. 14605 per hectare, respectively. Moreover, the value of overall B-C ratio over variable and total cost was 2.66 & 1.27 which indicated the economic viability of cluster bean cultivation in the study area. Similar, findings were also observed by Rundla *et al*., (2024) [8].

Table 1: Cost and returns of cluster bean cultivation (Rs./ha.)

S. N.	Particulars	Fatehabad		Sirsa		Bhiwani		Rewari		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
1	Field Preparation	2.9	5075 (9.00)	3.1	5425 (9.45)	2.6	4453 (8.47)	2.8	4760 (9.15)	2.9	4928 (9.03)
2	Seed(Kg.) & sowing	12.3	2990 (5.30)	11.3	2925 (5.10)	12.0	2938 (5.59)	12.8	3025 (5.82)	12.1	2970 (5.44)
3	Manure & fertilizer		1420 (2.52)		1525 (2.66)		1275 (2.42)		1313 (2.52)		1383 (2.53)
4	Irrigation		1725 (3.06)		1363 (2.38)		1950 (3.71)		1275 (2.45)		1578 (2.89)
5	Plant protection		4525 (8.02)		4875 (8.50)		4225 (8.03)		4063 (7.81)		4422 (8.10)
6	Harvesting & Threshing		10125 (17.95)		9950 (17.34)		9525 (18.11)		9725 (18.70)		9831 (18.01)
	Total (1 to 6)		25860 (45.85)		26063 (45.42)		24366 (46.32)		24161 (46.46)		25113 (45.99)
7	Interest on working Capital		905 (1.60)		912 (1.59)		853 (1.62)		846 (1.63)		879 (1.61)
8	Variable cost		26765 (47.45)		26975 (47.01)		25219 (47.94)		25007 (48.08)		25991 (47.60)
9	Management & risk factor		5353 (9.49)		5395 (9.40)		5044 (9.59)		5001 (9.62)		5198 (9.52)
10	Transportation		788 (1.40)		763 (1.33)		838 (1.59)		775 (1.49)		791 (1.45)
11	Rental value of land		23500 (41.66)		24250 (42.26)		21500 (40.87)		21225 (40.81)		22619 (41.43)
12	Total Cost		56406 (100.0)		57383 (100.00)		52601 (100.0)		52008 (100.0)		54599 (100.00)
13	(a) Main Product (qt)	12.6	64890	12.22	62811	12.1	62678	12.25	63577.5	12.29	63489
14	(b)By Product		6200		5560		5000		6100		5715
15	Gross return		71090		68371		67678		69677.5		69204
16	Return over variable cost		44325		41396		42459		44671		43213
17	Net return		14684		10988		15077		17670		14605
18	B: C (Over VC)		2.66		2.53		2.68		2.79		2.66
19	B: C (Over TC)		1.26		1.19		1.29		1.34		1.27

Resource use efficiency in cluster bean cultivation in Haryana

The value of the coefficient of multiple determinations, R square (R^2 estimated 0.4868) indicated that 48.68 per cent of variation in the total gross income of cluster bean cultivation was explained by explanatory variables included in the model. Out of five independent variables included in the model, two variables had statistically significant effect on the income attained from cluster bean cultivation. The variables like chemical fertilizers and plant protection (10% level of significance) were reported.

The estimated marginal value product (MVP) and efficiency ratios of different inputs used in cluster bean production were presented in table 2. The efficiency ratio of the inputs: machine labour (1.26), chemical fertilizers (2.32), plant protection (2.81) and irrigation (1.56) were greater than one indicating that the uses of these inputs were underuse. While, human labour and seed cost both were less than one *i.e.* 0.03 which indicated over utilization of these resources (Table 2). Similar, results were also recorded by Sumit *et al*., (2023) [11].

Table 2: Resource use efficiency in cluster bean cultivation

Particulars	GM	Coefficients	MVP	MFC	R = efficiency ratio	Efficiency
Human labour	9.72	0.02	0.03	1.00	0.03	Over utilized
Machine labour	8.27	0.73	1.26	1.00	1.26	Under utilized
Seed cost	6.13	0.01	0.03	1.00	0.03	Over utilized
Chemical fertilizers	6.31	1.02*	2.32	1.00	2.32	Under utilized
Pl. Protection	6.87	1.35*	2.81	1.00	2.81	Under utilized
Irrigation	6.15	0.67	1.56	1.00	1.56	Under utilized
R^2	0.4868					

* Significant at 10% level

Constraints faced by cluster bean growers in Haryana

The constraints faced by growers in cultivation of cluster bean are presented in table 3. Major constraints were non fixation of MSP and insurance scheme for this crop as revealed by 91.66 per cent of the growers followed by less availability of good quality seed (88.33%), less adoption of package practices like under dose of fertilizer (85.00%), low adoption of plant protection chemicals like seed treatment (80.00%), price fluctuations in post-harvest period (76.66%), manual harvesting causing skin rashes responsible for labour scarcity (68.66%). Similar constraints were also observed by Ashoka *et al.*, (2021) [1].

Table 3: Production and marketing constraints faced by cluster bean farmers in study area (n=60)

S. No.	Particulars	No of respondents	Percentage
1.	Non fixation of MSP and insurance scheme for this crop	55	91.66
2.	Less availability of good quality seed	53	88.33
3.	Less adoption of package practices like under dose of fertilizer	51	85.00
4.	Low adoption of plant protection chemicals like seed treatment	48	80.00
5.	Price fluctuations in post-harvest period	46	76.66
6.	Manual harvesting causing skin rashes responsible for labour scarcity	41	68.66

Conclusion

The study concluded that the major components of variable cost in cluster bean were expenditure incurred on harvesting & threshing was the highest followed by field preparation, plant protection, seed & sowing, irrigation and manure & fertilizers in all the four districts, respectively and overall. Similarly, rental value of land was the highest followed by management & risk factor were the major components of fixed cost in all the four districts and overall. The cost benefit ratio was more than one in all the four districts and overall which indicated that cluster bean in the study area was profitable. The value of the coefficient of multiple determinations, R square (R^2 estimated 0.4868) indicated that 48.68 per cent of variation in the total gross income of cluster bean cultivation was explained by explanatory variables included in the model. The efficiency ratio of the inputs: machine labour, chemical fertilizers, plant protection and irrigation were greater than one indicating that the uses of these inputs were underuse. While, human labour and seed cost both were less than one which indicated over utilization of these resources. Major constraints were non fixation of MSP and insurance scheme for this crop followed by less availability of good quality seed less adoption of package practices like under dose of fertilizer, low adoption of plant protection chemicals like seed treatment, Price fluctuations in post-harvest period and manual harvesting causing skin rashes responsible for labour scarcity.

References

1. Ashoka N, Raju R, Ravi Y, Harshavardhan M, Hongal S, Pushpa P. Economic analysis of cluster bean [*Cyamopsis tetragonoloba* (L.) Taub] entrepreneurs in Karnataka. Legume Research. 2021;44(12):1465-1469.
2. Bajwan A, Singh G, Walia I, Bishnoi R, Kumar A. Economic analysis of production and processing of cluster bean in Southern Haryana: A review. International Journal of Environment and Climate Change. 2023;13(9):2190-2201.
3. Bhatt RK, Jukanti AK, Roy MM. Cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.), an important industrial arid legume: A review. Legume Research: An International Journal. 2017;40(2).
4. Bhupender, Kumar A. An economic analysis of production and marketing of cluster bean in Rajasthan. International Journal of Current Microbiology and

Applied Sciences. 2020;9(6):4044-4055.
5. Guar Gum Global Market. Available from: https://www.guargum.biz/page/guargum-global-market.
6. Kumar R, Pareek NK, Rathore VS, Nangiya V, Yadava ND, Yadav RS. Effect of water and nitrogen levels on yield attributes, water productivity and economics of cluster bean (*Cyamopsis tetragonoloba*) in hot arid region. Legume Research. 2020;45(5):702-705. doi: 10.18805/LR-4076.
7. Rai PS, Dharmatti PR. Genetic divergence studies in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.). Global Journal of Science Frontier Research Agriculture and Veterinary. 2013;13:1-5.
8. Rundla S, Shrivastava SC, Lamba HK, Singh S, Nitharwal K, Yadav D. Analysis of the cost of cultivation and returns for cluster bean in the Gird region of Madhya Pradesh, India. Journal of Experimental Agriculture International. 2024;46(12):236-243.
9. Sharma P, Dubey G, Kaushik S. Chemical and medico-biological profile of *Cyamopsis tetragonoloba* (L.) Taub: An overview. Journal of Applied Pharmaceutical Science. 2011;1(2):32-37.
10. Singh D. Marketing of cluster bean (Guar) (*Cyamopsis tetragonoloba*) in Churu District of Rajasthan. Small. 2015;5:3-87.
11. Sumit, Malik DP, Pawar N. Resource use efficiency and constraints in the production of direct seeded rice in Haryana, India. Asian Journal of Agricultural Extension, Economics & Sociology. 2023;41(10):159-164.
12. Yadav H, Shalendra. An analysis of performance of guar crop in India (2013-14). CCS National Institute of Agricultural Marketing. Available from: www.ccsniam.gov.in.